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THE

# FLOWERING PLANTS AND FERNS

OF

# GREAT BRITAIN:

AN ATTEMPT TO CLASSIFY THEM ACCORDING TO THEIR

## GEOGNOSTIC RELATIONS.

A PAPER READ BEFORE THE BRITISH ASSOCIATION FOR THE
ADVANCEMENT OF SCIENCE, AT THE TWENTY-FIFTH
ANNUAL MEETING, GLASGOW, 1855.

WITH ADDITIONS.

By JOHN GILBERT BAKER.

> "Objectum scientiæ est, constans et æternum in infinita varietate quærere."—*Fries.*
>
> "Mais quelle que soit la formule ou la loi générale de dispersion dont l'avenir reserve la connaisance à la science, il devra d'une maniere ou d'une autre, tenir compte des proprietès des rouches soujacentes."—*Thurmann* (*Essai de Phytostatique*, vol. ii. p. 323).

LONDON:
W. & F. G. CASH, 5, BISHOPSGATE STREET WITHOUT.
SOLD BY W. PAMPLIN, FRITH STREET, SOHO SQUARE.

1855.

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# FLOWERING PLANTS AND FERNS

# OF BRITAIN.

## I.—Fundamental Generalities.

1. In regulating the distribution of species and modifying specific types, the subjacent geological formations, principally by reason of their mechanical properties, exercise an influence which, taken as a whole, is secondary only to that of climate, which it modifies and by which it is modified perpetually.

2. With reference to the facility with which they yield to disintegration and to their hygroscopicity and porosity (*i. e.* lithologically) strata are essentially separable into two principal classes, *dysgeogenous* and *eugeogenous.*

3. *Dysgeogenous* formations are those which are disintegrated with difficulty, and yield only a feeble detritus. On a grand scale, they absorb moisture readily, and furnish stations characterized by their comparative dryness. Rocks of this class mostly contain a large proportion of carbonate of lime in their composition.

4. *Eugeogenous* formations are those which abrade easily, and yield an abundant superficial detritus, which may be either of a sandy or clayey nature. They are comparatively impermeable, and consequently hygroscopic upon a grand scale, furnishing damper stations than the rocks of the opposite category, especially when the detritus is clayey.

5. Every species possesses essentially its characteristic special range of lithological adaptability, in the same way that each possesses its characteristic special range of climatic adaptability. Under equal climatic conditions, some species are restricted to more or less distinctly marked *dysgeogenous* situations, and others to more or less distinctly marked *eugeogenous* situations: but a greater number can adapt themselves, more or less decidedly, to stations of either class.

6. In proportion as we advance from an austral to a boreal, and from a continental to an insular climate, the proportion in number which the *restricted* (*i. e.* dysgeogenous and eugeogenous) bear to the *ubiquitous* species, lessens, principally through reason of many of the eugeogenous species being able, under more humid conditions of climate, to adapt themselves also to dysgeogenous situations.

## II.—THE FIELD OF STUDY, LITHOLOGICALLY VIEWED.

For phytostatic purposes, the surface of Britain may be conveniently considered as subdivided into six lithological zones.*

1. A zone of moderately eugeogenous formations, for the most part metamorphic or endogenous as regards their geological character (granite, gneiss, and mica-schist), furnishing a sandy detritus, repulsing some of the eugeogenous plants of clayey situations, but admitting to a considerable extent several of the less decidedly characterized dysgeogenous species. It includes the surrounding islands, and the whole of the mainland of Scotland north of a line drawn from the estuary of the Clyde to

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* These may be readily traced out upon any of the geological maps of the island. That of Forbes and Johnston, recently published by Blackwood and Sons, is the most complete. A map coloured lithologically was shown when the paper was read, but it does not seem needful to reproduce it here.

the opposite coast, through the centre of the shires of Perth, Forfar, and Kincardine. The Orkneys and northern parts of the coasts of the mainland furnish sedimentary deposits (Silurian and Devonian) still eugeogenous, but the igneous rocks of the Inner Hebrides and Shetland, and more particularly the sparing oolites of Mull, Skye, Argyle, and Sutherland, must rather be referred to the opposite category.

2. A zone of mixed formations, belonging in greater part to the Silurian and Devonian systems of geologists, in which the eugeogenous character on the whole decidedly predominates, but which enclose in several places typically dysgeogenous portions. It includes nearly the whole of the remainder of Scotland, and passes southward through Cumberland, Westmoreland, and Lake Lancashire. Still further south, the eastern boundary is for a space nearly coincident with the line of limit between England and Wales, but diverges so as to comprise the south of Shropshire with Herefordshire and Monmouthshire; and afterwards crosses to the English Channel so as to cut off Cornwall, Devonshire, and a small part of the west of Somersetshire. The most striking dysgeogenous portions are the carboniferous limestones of the Lake district, with those of the north and south coasts of Wales, and the fine-grained compact limestones of North Devonshire and Somersetshire; also, but admitting more readily many eugeogenous species, the igneous strata between the firths of Clyde, Tay, and Forth, and the similar rocks of Cumberland and South Cornwall. In addition to these many of the deposits of the Silurian system on the borders of Wales are more or less calcareo-dysgeogenous, as the Woolhope, Wenlock, Aymestry, and Dudley sets of beds.

3. A zone of formations of scarcely exceptional dysgeogenous character. It comprises the greater part of the Cheviot Hills,

the older carboniferous strata of the Pennine chain as far south as Staffordshire and Derbyshire, and the parallel narrow terrace of magnesian limestone that runs between the Wear and the Trent, enclosing the coal-fields of Durham and West Yorkshire. Of its formations, the Mountain and Permian limestones are the most distinctly dysgeogenous: the Millstone grits and basalts appear to manifest the same lithological character in a less typical degree, but the coal measures partake more of a eugeogenous stamp.

4. The new red sandstone strata which follow next furnish a well marked eugeogenous zone, extending from the Tees to the Channel, narrowed between the succeeding and two preceding zones at its northern and southern extremities, but expanding in the centre so as to include several of the Midland counties, from the Cheshire coast eastward to Leicestershire and Warwickshire. This zone also includes the Midland coal-fields.

5. The south-eastern half of England, with the exception of the districts afterwards to be mentioned, is occupied by secondary formations of a more or less distinctly marked dysgeogenous type, belonging to the liassic, oolitic, wealden, and cretaceous groups. Of these the middle and upper (Oxford and Portland) oolites are the most characteristic: the strata of the chalk series more readily disintegrable, but generally tolerably permeable: whilst the liassic, lower oolitic, and wealden deposits furnish a third stage of gradation. The dry sandy tracts of the centre of Norfolk and Suffolk supply a neutral ground on which many distinctly dysgeogenous and distinctly eugeogenous species meet and mingle together. On the west, this zone is bounded by a line drawn obliquely from the mouth of the Tees to the western margin of Dorsetshire.

6. The marsh lands that margin the coasts of South-east Yorkshire, Lincolnshire, and the estuary of the Wash, including the whole of what is usually called the "fen country," furnish well-marked clayey eugeogenous stations. The tertiary strata of the London and Hampshire basins are very varied in character, clearly of the same character taken as a whole, but admitting occasionally some of the less typically dysgeogenous species. Some of the districts of the later part of the cretaceous series would range as naturally under this zone as under the preceding.

These zones may be conveniently designated either according to their geognostic characteristics:—

1. Psammo-eugeogenous.
2. Mixed.
3. Primary dysgeogenous.
4. Eugeogenous.
5. Secondary dysgeogenous.
6. Subeugeogenous.

Or according to the adjacent parts of the Continent, to which they appear lithologically and climatically to bear the greatest analogy:—

1. Scandinavian.
2. Subscandinavian.
3. Primary Jurassic.
4. Belgic.
5. Secondary Jurassic.
6. Gallic.

The eighteen provinces into which Britain is subdivided in Watson's "Cybele" are distributed amongst these lithological zones, as below:—

1. *Psammo-eugeogenous or Scandinavian zone.*—North Isles, North Highlands; nearly the whole of East Highlands and West Highlands.

2. *Mixed or Subscandinavian zone.*—The Lakes, North Wales, South Wales; the greater part of East Lowlands, West

Lowlands, and the Peninsula; a small part of East Highlands, West Highlands, and Severn.

3. *Primary dysgeogenous or Jurassic zone.*—Nearly the whole of Tyne; part of Humber, Mersey, and Trent; a small part of East Lowlands and West Lowlands.

4. *Eugeogenous or Belgic zone.*—The greater part of Severn; part of Humber, Mersey, Trent, and the Peninsula; a small part of Tyne.

5. *Secondary dysgeogenous or Jurassic zone.*—The greater part of Ouse and Channel; part of Humber, Trent, and Thames; a small part of Severn.

6. *Subeugeogenous or Gallic zone.*—The greater part of Thames; part of Humber, Trent, Ouse, and Channel.

If we reverse the process of distribution, the following table will exhibit the result:—

| | Provinces. | Lithological zones. |
|---|---|---|
| 1. | Peninsula | 2, 4. |
| 2. | Channel | 5, 6. |
| 3. | Thames | 5, 6. |
| 4. | Ouse | 5, 6. |
| 5. | Severn | 2, 4, 5. |
| 6. | South Wales. | 2. |
| 7. | North Wales | 2. |
| 8. | Trent | 3, 4, 5, 6. |
| 9. | Mersey | 3, 4. |
| 10. | Humber | 3, 4, 5, 6. |
| 11. | Tyne | 3, 4. |
| 12. | Lakes | 2. |
| 13. | West Lowlands | 2, 3. |
| 14. | East Lowlands | 2, 3. |
| 15. | East Highlands | 1, 2. |
| 16. | West Highlands | 1, 2. |
| 17. | North Highlands | 1. |
| 18. | North Isles | 1. |

The following table will show which of the climatic zones[*] of the Cybele each of the several lithological divisions includes :—

| Lithological zones. | Climatic zones. | Lithological zones. | Climatic zones. |
|---|---|---|---|
| 1. | Superagrarian to Superarctic. | 4. | Inferagrarian to Midagrarian. |
| 2. | Inferagrarian to Midarctic. | 5. | Inferagrarian to Superagrarian. |
| 3. | Midagrarian to Midarctic. | 6. | Inferagrarian to Midagrarian. |

## III.—CLASSIFICATION.

In the following classification, the fourth edition of the London Catalogue is, with trifling exception, used as a standard for nomenclature and the limitation of species. The Roman numerals which are employed have reference to the natural orders: the Arabic numerals which follow the names indicate in how many of the eighteen provinces of the Cybele Britannica each species has been ascertained to occur in an apparently native condition.

In arranging the species, the first step will be to separate those which bear the appearance of being aboriginal inhabitants of our island from those which seem to have been directly or indirectly introduced by human agency at some period more or less remote. Thus two primary subdivisions are obtained :—

1. Native Species. 2. Introduced Species.

Those which come under the first of these heads are attempted to be apportioned out amongst the six classes defined in the following pages, as accurately as can be judged by means of the ascertained or available data relative to their distribution.

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[*] The whole surface of Britain is considered as subdivided into six of these climatic zones, three to a "region," the line which separates the two regions (which are called Agrarian and Arctic) being marked by the upper limit of the possible cultivation of grain, about 600 yards in the North of England, and 450 in the Scotch Highlands.

Class A. *Dysgeogenous species.—Species which exhibit a decidedly marked preference for dysgeogenous districts. As a general rule, these attain the maxima of their distribution in the third and fifth of the zones which have been indicated:—*

I. Clematis Vitalba, 6. Anemone Pulsatilla, 5. Helleborus viridis, 8. H. fœtidus, 8. Aquilegia vulgaris, 13. Actæa spicata, 1. IV. Thlaspi perfoliatum, 2. T. alpestre (including occitanum and virens), 6. Hutchinsia petræa, 6. Draba aizoides, 1. D. muralis, 6. Cardamine impatiens, 7. Arabis stricta, 2. VI. Helianthemum vulgare, 15. H. polifolium, 1. H. canum, 4. IX. Polygala calcarea, 2. P. uliginosa, 1. XII. Dianthus cæsius, 1. Silene nutans, 8. Arenaria uliginosa, 1. XIII. Linum perenne, 6. XVI. Hypericum montanum, 12. XVIII. Geranium sanguineum, 16. XXIII. Astragalus glycyphyllos, 14. A. Hypoglottis, 9. Hippocrepis comosa, 10. Onobrychis sativa, 8. XXIV. Spiræa Filipendula, 13. Potentilla fruticosa, 3. P. verna, 12. Cotoneaster vulgaris, 1. Pyrus Aria (including fennica and scandica), 13. XXXVIII. Trinia vulgaris, 2. Carum Bulbocastanum, 2. Bupleurum aristatum, 1. Seseli Libanotis, 3. XLI. Galium pusillum, 12. Asperula Cynanchica, 9. XLIII. Scabiosa columbaria, 13. XLIV. Hypochœris maculata, 3. Hieracium hypochœridoides, 1. Carduus eriophorus, 10. C. acaulis, 7. Chrysocoma Linosyris, 2. Cineraria campestris, 5. Inula Conyza, 11. XLV. Campanula glomerata, 12. Phyteuma orbiculare, 2. L. Gentiana verna, 3. Polemonium cæruleum, 3. LII. Atropa Belladonna, 12. LIV. Orobanche caryophyllacea, 1. LV. Calamintha Nepeta, 11. C. officinalis, 12. C. sylvatica, 1. Teucrium Botrys, 1. LVI. Lithospermum purpuro-cæruleum, 4. LXVI. Thesium humifusum, 5. LXVII. Asarum europæum, 4. LXIX. Euphorbia stricta, 1. Buxus sempervirens, 3. LXXIII. Spiranthes autumnalis, 11. Epipactis ovalis, 6. E. grandiflora, 9. E. ensifolia, 11. E. rubra, 3. Orchis ustulata, 9. O. militaris, 1. O. tephrosanthos, 1. O. fusca, 1. O. hircina, 1. O. pyramidalis, 13. Aceras anthropophora, 4. Herminium Monorchis, 5. Ophrys apifera (including arachnites), 10. O. aranifera (including fucifera), 4. O. muscifera, 10. Cyprîpedium Calceolus, 3. LXXVI. Convallaria majalis, 13. C. multiflora, 11. C. Polygonatum, 6. LXXXV. Carex montana, 2. C. clandestina, 3. C. digitata, 5.

LXXXVI. Sesleria cærulea, 5. Festuca sylvatica, 8. Brachypodium pinnatum, 7. Hordeum sylvaticum, 8. LXXXVII. Ceterach officinarum, 15. Polypodium calcareum, 11. Lastrea rigida, 3.

Subclass AB. *Subdysgeogenous species.—Species which appear to exhibit a partiality for dysgeogenous districts, but less distinct than that shown by those previously enumerated:—*

I. Thalictrum minus, 17. T. flexuosum. T. saxatile. IV. Draba incana, 9. Arabis hirsuta, 17. V. Reseda lutea, 12. XII. Sagina nodosa, 18. Arenaria tenuifolia, 6. A. verna (including Gerardi), 12. Cerastium arvense, 13. XVI. Hypericum hirsutum, 15. XXII. Rhamnus catharticus, 12. XXIII. Anthyllis vulneraria, 18. XXIV. Dryas octopetala, 6. Rubus saxatilis, 14. Rosa spinosissima, 18. R. Sabini, 11. R. rubiginosa, 15. Poterum Sanguisorba, 15. P. muricatum, 4. XXV. Epilobium angustifolium, 18. XXXV. Parnassia palustris, 16. XXXVIII. Pimpinella magna, 9. Pastinaca sativa, 10. XL. Viburnum Lantana, 8. XLI. Rubia peregrina, 6. XLIII. Dipsacus pilosus, 9. XLIV. Crepis biennis, 6. C. succisæfolia, 5. Hieracium gothicum (*Fries.*), 3. Borkhausia taraxacifolia, 2. Carlina vulgaris, 16. Erigeron acris, 14. XLV. Campanula rapunculoides, 5. C. Trachelium, 8. Specularia hybrida, 8. XLVI. Monotropa Hypopitys, 9. XLVIII. Ligustrum vulgare, 10. L. Gentiana Amarella, 17. G. campestris, 18. Chlora perfoliata, 10. LIII. Verbascum Lychnitis, 5. V. floccosum, 1. V. nigrum, 8. Melampyrum cristatum, 3. M. arvense, 2. Linaria spuria, 7. L. Elatine, 10. LIV. Orobanche elatior, 10. O. rubra, 6. Lathræa squamaria, 14. LV. Salvia verbenaca, 13. S. pratensis, 1. Origanum vulgare, 16. Calamintha Acinos, 15. Melittis Melissophyllum, 4. Ajuga Chamæpitys, 3. Lamium Galeobdolon, 10. Stachys germanica, 3. LVI. Lithospermum officinale, 17. LVIII. Primula farinosa, 5. LXIX. Euphorbia amygdaloides, 10. LXXI. Fagus sylvatica, 11. LXXII. Juniperus communis (including nana), 18. Taxus baccata, 13. LXXIII. Neottia Nidus-avis, 15. Epipactis media (including purpurata), 8. Gymnadenia conopsea, 18. Habenaria bifolia (including chlorantha), 17. LXXVI. Gagea lutea, 12. Ruscus aculeatus, 8. LXXXVI. Phleum Boehmeri, 2. Avena pratensis, 16. Melica nutans, 10. Bromus erectus, 10.

Class B. *Ubiquitous species.—Species which do not appear to exhibit a particular preference for either dysgeogenous or eugeogenous stations. These are the plants which, upon all soils and at all levels, compose the general mass of the vegetation. Every species which is ranged here has been ascertained to occur in at least five provinces :—*

I. Thalictrum alpinum, 9. Anemone nemorosa, 17. Myosurus minimus, 9. Ranunculus aquatilis, 18. R. hederaceus, 18. R. cænosus, 12. R. Ficaria, 18. R. Flammula, 18. R. auricomus, 15. R. acris, 18. R. repens, 18. R. bulbosus, 16. R. hirsutus, 16. R. parviflorus, 11. Caltha palustris, 18. Trollius europæus, 14. III. Meconopsis cambrica, 5. III.* Fumaria capreolata, 18. F. officinalis, 18. IV. Coronopus Ruellii, 15. Capsella bursa-pastoris, 18. Lepidium Smithii, 16. L. campestre, 15. Cochlearia officinalis (including danica and anglica), 18. Draba verna, 17. Cardamine amara, 15. C. pratensis, 18. C. hirsuta (including sylvatica), 18. Arabis thaliana, 17. Turritis glabra, 10. Barbarea vulgaris, 15. Nasturtium officinale, 18. N. terrestre, 16. Sisymbrium officinale, 18. Erysimum Alliaria, 17. Sinapis arvensis, 18. S. tenuifolia, 13. V. Reseda luteola, 16. VII. Viola palustris, 18. V. odorata (including alba and hirta), 15. V. canina (sylvatica), 18. V. flavicornis (including lactea), 14. V. tricolor, 18. V. lutea, 14. VIII. Drosera rotundifolia, 18. D. intermedia, 13. D. anglica, 13. IX. Polygala vulgaris (including oxyptera and depressa), 18. XII. Dianthus Armeria, 11. D. deltoides, 11. Silene inflata, 17. S. anglica, 14. Lychnis Flos-cuculi, 18. L. diurna, 18. L. vespertina, 14. Mœnchia erecta, 11. Sagina procumbens, 18. S. apetala, 14. Spergula arvensis, 18. Spergularia rubra, 17. Arenaria serpyllifolia, 18. A. trinervis, 16. Stellaria nemorum, 12. S. media, 18. S. holostea, 18. S. graminea, 18. S. uliginosa, 18. Cerastium glomeratum, 18. C. triviale, 18. C. semidecandrum, 16. C. tetrandrum, 16. XIII. Linum angustifolium, 7. L. catharticum, 18. XIV. Malva moschata, 16. M. sylvestris, 17. M. rotundifolia, 14. Althæa officinalis, 8. XV. Tilia parvifolia, 8. XVI. Hypericum Androsæmum (including anglicum), 15. H. perforatum, 16. H. dubium, 15. H. quadrangulum, 17. H. humifusum, 16. H. pulchrum, 18. XVII. Acer campestre, 10.

XVIII. Erodium maritimum, 9. E. cicutarium, 18. Geranium sylvaticum, 12. G. pratense, 16. G. rotundifolium, 5. G. pusillum, 13. G. molle, 18. G. dissectum, 17. G. columbinum, 15. G. lucidum, 17. G. robertianum, 18. XX. Oxalis Acetosella, 18. XXI. Euonymus europæus, 14. XXIII. Spartium scoparium, 17. Ulex europæus, 17. U. nanus (including Gallii), 12. Genista tinctoria, 14. G. anglica, 17. Ononis arvensis, 17. O. antiquorum, 16. Medicago lupulina, 17. M. maculata, 10. M. denticulata, 5. Trifolium repens, 18. T. pratense, 18. T. medium, 18. T. arvense, 17. T. scabrum, 13. T. striatum, 14. T. procumbens, 18. T. minus, 14. T. filiforme, 17. Lotus corniculatus, (including tenuis), 18. L. major, 16. Ornithopus perpusillus, 16. Vicia sylvatica, 17. V. Cracca, 18. V. sativa (including angustifolia), 18. V. lathyroides, 17. V. sepium, 18. V. bithynica, 7. V. hirsuta, 18. V. tetrasperma (including gracilis), 13. Lathyrus Aphaca, 5. L. Nissolia, 6. L. pratensis, 18. L. sylvestris, 14. Orobus tuberosus, 18. XXIV. Prunus spinosa, 17. P. Padus, 15. P. Cerasus, 10. Spiræa Ulmaria, 18. Geum urbanum, 17. G. rivale, 18. Agrimonia Eupatoria (including odorata), 16. Potentilla anserina, 18. P. argentea, 13. P. alpestris, 5. P. reptans, 16. P. Tormentilla, 18. P. Fragariastrum, 16. Comarum palustre, 18. Fragaria vesca, 18. Rubus Chamæmorus, 11. R. Idæus, 18. R. fruticosus (including cæsius, etc.), 18. Rosa villosa, 16? R. tomentosa, 12. R. inodora, 10. R. micrantha, 8. R. canina, 18. R. arvensis, 14. Sanguisorba officinalis, 14. Alchemilla vulgaris, 18. A. arvensis, 18. Cratægus oxyacantha, 17. Pyrus Malus, 16. P. Aucuparia, 18. XXV. Epilobium hirsutum, 15. E. parviflorum, 15. E. montanum, 18. E. roseum, 8. E. palustre (including virgatum), 18. E. tetragonum (including obscurum), 17. E. alpinum, 5. E. alsinifolium, 8. Circæa lutetiana, 17. C. alpina, 6. XXVI. Myriophyllum alterniflorum, 17. M. spicatum, 18? Callitriche verna, 18. C. platycarpa, 16. C. pedunculata, 16. XXVII. Lythrum Salicaria, 16. XXIX. Bryonia dioica, 10. XXX. Montia fontana, 18. XXXI. Scleranthus annuus, 17. XXXIII. Ribes rubrum (including petræum), 15? R. alpinum, 10. XXXIV. Sedum Rhodiola, 10. S. Telephium, 17. S. villosum, 7. S. acre, 18. S. rupestre, 5. Cotyledon Umbilicus, 13. XXXV. Saxifraga Hirculus, 7. S. aizoides, 8. S. oppositifolia, 8. S. granulata, 13. S. tridactylites, 15. S. hypnoides, 14. Chrysosplenium oppositifolium, 18. C. alternifolium, 15. XXXVI. Adoxa moschatellina, 16. Hedera Helix, 18. XXXVII. Cornus sanguinea, 11. C. suecica, 5. XXXVIII. Hydrocotyle vulgaris, 18. Sanicula europæa, 17. Conium maculatum, 18. Petroselinum segetum, 8. Heliosciadium nodiflorum (including repens), 15. H. inundatum, 18. Sison Amomum, 12. Ægopodium Podagraria, 16. Bunium flexuosum, 18. Pimpinella Saxifraga, 17. Bupleurum tenuissimum, 8. Œnanthe fistulosa, 15. Œ. crocata, 16. Silaus pratensis, 12. Meum athamanticum, 9. Angelica sylvestris, 18. Heracleum Sphondylium, 18. Daucus Carota, 18. Torilis Anthriscus, 15. T. infesta, 10. T. nodosa, 13. Anthriscus vulgaris, 16. A. sylvestris, 18. Chærophyllum temulentum, 17. Myrrhis odorata, 14. XXXIX. Viscum album, 8. XL. Sambucus nigra, 18. S. Ebulus, 16. Viburnum Opulus, 17. Lonicera Periclymenum, 18. XLI. Galium verum, 18. G. cruciatum, 16. G. palustre (including elongatum), 18. G. uliginosum, 14. G. saxatile, 18. G. Mollugo, 13. G. Aparine, 18. G. boreale, 10. Sherardia arvensis, 17. Asperula odorata, 18. XLII. Valeriana dioica, 15. V. officinalis (including sambucifolia), 18. Fedia olitoria, 18. XLIII. Dipsacus sylvestris, 15. Scabiosa succisa, 18. Knautia arvensis, 18. XLIV. Tragopogon pratensis (including minor), 15. Helminthia echioides, 12. Picris hieracioides, 10. Apargia hispida, 15. A. autumnalis, 18. Hypochœris radicata, 18. Lactuca virosa, 11. L. muralis, 12. Sonchus arvensis, 18. S. asper, 18. S. oleraceus, 18. Crepis virens, 18. C. paludosa, 13. Hieracium Pilosella, 18. H. cerinthoides (including Lawsoni), 6. H. pallidum, 5. H. murorum. H. cæsium. H. vulgatum, 18. H. prenanthoides, 6. H. tridentatum. H. corymbosum, 5. H. crocatum, 5. H. umbellatum, 17. H. boreale, 16. Taraxacum officinale, 18. Lapsana communis, 18. Cichorium Intybus, 16. Arctium Lappa (including Bardana), 18. Serratula tinctoria, 13. Carduus nutans, 13. C. acanthoides, 16. C. lanceolatus, 18. C. palustris, 18. C. arvensis, 18. C. heterophyllus, 13. Centaurea nigrescens, 10. C. nigra, 18. C. Scabiosa, 15. Eupatorium cannabinum, 17. Tanacetum vulgare, 18. Artemesia Absinthium, 14. A. vulgaris, 18. Gnaphalium dioicum, 17. G. sylvaticum (including norvegicum), 18. G. uliginosum, 18. Filago germanica (including apiculata and spathulata), 18. Petasites vulgaris, 16. Tussilago Farfara, 18. Solidago Virgaurea, 18. Senecio vulgaris, 18. S. sylvaticus, 18. S. erucæfolius, 13. S. Jacobæa, 18.

S. aquaticus, 18. Inula Helenium, 10. Pulicaria dysenterica, 15. Bellis perennis, 18. Chrysanthemum Leucanthemum, 18. Pyrethrum inodorum (with maritimum), 18. Matricaria Chamomilla, 14. Anthemis nobilis, 13. A. arvensis, 14. A. Cotula, 15. Achillea Ptarmica, 18. A. Millefolium, 18. XLV. Campanula rotundifolia, 18. C. patula, 7. C. latifolia, 14. XLVI. Erica Tetralix, 18. E. cinerea, 18. Calluna vulgaris, 18. Andromeda polifolia, 13. Arbutus Uva-ursi, 8. Vaccinium myrtillus, 18. V. uliginosum, 6. V. Vitis-Idæa, 14. V. Oxycoccos, 16. Pyrola rotundifolia, 9. P. media, 12. P. minor, 15. P. secunda, 7. XLVII. Ilex Aquifolium, 18. XLVIII. Fraxinus excelsior, 17. L. Gentiana Pneumonanthe, 9. Erythræa Centaurium (including littoralis, pulchella, and latifolia), 18. Menyanthes trifoliata, 18. LI. Convolvulus arvensis, 14. C. sepium, 16. Cuscuta europæa, 8. C. Epithymum, 11. LII. Hyoscyamus niger, 17. Solanum Dulcamara, 17. LIII. Verbascum Thapsus, 16. Veronica spicata, 5. V. arvensis, 18. V. serpyllifolia, 18. V. scutellata, 18. V. Anagallis, 17. V. Beccabunga, 18. V. officinalis, 18. V. montana, 16. V. Chamædrys, 18. V. hederifolia, 18. V. agrestis, 18. V. polita, 15. Bartsia Odontites, 18. Euphrasia officinalis, 18. Rhinanthus Crista-galli (including major), 18. Melampyrum pratense, 18. M. sylvaticum, 7. Pedicularis palustris, 18. P. sylvatica, 18. Scrophularia nodosa, 18. S. Ehrharti, 8. S. aquatica, 14. Digitalis purpurea, 18. Antirrhinum Orontium, 8. Linaria repens, 7. L. minor, 12. LIV. Orobanche major, 12. O. minor (including amethystea, *Angl.*), 7. O. hederæ, 5. LV.* Verbena officinalis, 11. LV. Lycopus europæus, 17. Mentha rotundifolia, 11. M. sylvestris, 13. M. piperita, 14. M. aquatica, 18. M. sativa, 15. M. arvensis, 18. Thymus Serpyllum (including Chamædrys), 18. Calamintha Clinopodium, 15. Teucrium Scorodonia, 18. Ajuga reptans, 18. Ballota nigra, 13. Lamium album, 14. L. amplexicaule, 18. L. purpureum (including incisum), 18. Galeopsis Ladanum, 15. G. Tetrahit (including bifida), 18. G. versicolor, 15. Stachys Betonica, 15. S. palustris (including ambigua), 18. S. sylvatica, 18. S. arvensis, 18. Glechoma hederacea, 18. Nepeta Cataria, 12. Marrubium vulgare, 13. Prunella vulgaris, 18. Scutellaria galericulata, 18. LVI. Myosotis palustris, 15. M. repens, 16. M. cæspitosa, 18. M. sylvatica, 12. M. arvensis, 18. M. collina, 16. M. versicolor, 18. Lithospermum arvense, 18. Symphytum officinale, 15. S. tuberosum, 11. Lycopsis arvensis, 18. Cynoglossum officinale, 14. Echium vulgare, 18. LVII. Pinguicula vulgaris, 18. Utricularia vulgaris, 16. LVIII. Primula vulgaris, 18. P. veris, 17. Trientalis europæa, 8. Lysimachia Nummularia, 13. L. nemorum, 17. Anagallis arvensis (including cærulea), 16. A. tenella, 17. LX. Plantago major, 18. P. media, 14. P. lanceolata, 18. P. Coronopus, 18. Littorella lacustris, 18. LXII. Chenopodium polyspermum, 9. C. urbicum, 8. C. rubrum, 14. C. album, 18. C. Bonus Henricus, 17. Atriplex hastata (including deltoidea), 18. A. patula (including erecta), 18. LXIII. Polygonum Bistorta, 16. P. viviparum, 8. P. amphibium, 18. P. lapathifolium (including laxum), 16. P. Persicaria, 18. P. Hydropiper, 17. P. aviculare, 18. P. Convolvulus, 18. Rumex crispus, 18. R. aquaticus, 9. R. pratensis, 9. R. obtusifolius, 18. R. sanguineus, 16. R. conglomeratus, 15. R. pulcher, 7. R. Acetosa, 18. R. Acetosella, 18. LXV. Daphne Laureola, 12. LXVIII. Empetrum nigrum, 14. LXIX. Euphorbia helioscopia, 18. E. exigua, 14. E. Peplus, 17. Mercurialis perennis, 18. M. annua, 11. LXX. Urtica urens, 18. U. dioica, 18. Parietaria officinalis, 16. Ulmus montana, 18? U. suberosa, 11. LXXI. Quercus Robur (including sessiliflora), 17. Carpinus Betulus, 5. Corylus Avellana, 18. Alnus glutinosa, 18. Betula alba (including glutinosa), 18. Populus tremula, 18. Salix pentandra, 14. S. fragilis, 15. S. alba (including vitellina), 16. S. triandra, 12. S. purpurea (including Helix), 15. S. rubra (including Forbyana), 10. S. viminalis, 15. S. Smithiana, 15. S. acuminata, 15? S. cinerea, 18. S. aurita, 18. S. Caprea, 18. S. nigricans, 7. S. phylicifolia, 6. S. fusca, 18. S. Lapponum, 6. S. herbacea, 9. Myrica Gale, 17. LXXIII. Listera cordata, 14. L. ovata, 17. Epipactis latifolia, 16. E. palustris, 15. Orchis Morio, 11. O. mascula, 18. O. latifolia, 18. O. maculata, 18. Habenaria viridis, 18. H. albida, 12. Malaxis paludosa, 14. LXXIV. Iris fœtidissima, 10. I. Pseudacorus, 18. LXXV. Narcissus Pseudonarcissus, 12. LXXVI. Fritillaria Meleagris, 5. Allium Scorodoprasum, 7. A. oleraceum (including carinatum), 10. A. vineale, 14. A. ursinum, 17. Hyacinthus nonscriptus, 18. LXXVI.* Paris quadrifolia, 15. LXXVII. Tamus communis, 12. LXXVIII. Colchicum autumnale, 11. Tofieldia palustris, 5. LXXX. Alisma Plantago, 17. A. ranunculoides, 17. Triglochin palustre, 18. LXXXI. Potamogeton densus, 12. P. pectinatus (including filiformis and flabellatus), 15. P. pusillus, 16. P. compressus, 13. P. crispus, 15. P. perfoliatus, 17. P. lucens, 14. P. prælongus, 8. P. heterophyllus, 15. P. rutescens, 17. P. natans, 18. P. oblongus, 14. P. plantagineus, 11. LXXXII. Lemna minor, 18. Arum maculatum, 14. Sparganium simplex, 17. S. ramosum, 18. Typha latifolia, 14. LXXXIV. Juncus conglomeratus, 18. J. effusus, 18. J. glaucus, 14. J. diffusus, 8. J. acutiflorus, 18. J. lamprocarpus, 18. J. obtusiflorus, 12. J. supinus, 18. J. compressus (including cœnosus), 13. J. bufonius, 18. J. squarrosus, 18. J. triglumis, 8. Luzula sylvatica, 18. L. pilosa (including Borreri), 18. L. Forsteri, 5. L. campestris, 18. L. multiflora, 18. Narthecium ossifragum, 18. LXXXV. Schœnus nigricans, 18. Rhyncospora alba, 17. Blysmus compressus, 13. Scirpus lacustris (including glaucus), 18. S. setaceus, 18. S. sylvaticus, 16. S. palustris, 18. S. uniglumis, 6. S. multicaulis, 13. S. pauciflorus, 17. S. cæspitosus, 18. S. acicularis, 15. S. fluitans, 16. Eriophorum vaginatum, 18. E. angustifolium, 18. E. latifolium, 16. Carex dioica, 17. C. pulicaris, 18. C. pauciflora, 6. C. stellulata, 18. C. ovalis, 18. C. curta (including Persoonii), 16. C. remota, 16. C. intermedia, 14. C. muricata, 15. C. divulsa, 9. C. vulpina, 16. C. teretiuscula (including Ehrhartiana), 12. C. paniculata, 17. C. vulgaris, 18. C. rigida, 10. C. stricta, 12. C. acuta, 15. C. flava, 18. C. pallescens, 17. C. fulva, 18. C. binervis, 18. C. lævigata, 14. C. panicea (including vaginata), 18. C. capillaris, 6. C. limosa (including irrigua), 12. C. strigosa, 10. C. sylvatica, 15. C. pendula, 15. C. glauca, 18. C. præcox, 16. C. pilulifera, 18. C. filiformis, 12. C. hirta, 15. C. ampullacea, 18. C. vesicaria, 16. C. paludosa, 16. C. riparia, 14. LXXXVI. Phalaris arundinacea, 18. Anthoxanthum odoratum 18. Phleum pratense, 18. Alopecurus pratensis, 18. A. geniculatus (including provus), 18. A. agrestis, 11. Milium effusum, 16. Agrostis canina, 18. A. vulgaris, 18. A. alba, 18. Arundo Phragmites, 18. A. Calamagrostis, 9. A. Epigejos, 16. Aira cæspitosa, 18. A. flexuosa, 18. A. caryophyllea, 18. A. præcox, 18. Avena pubescens, 17. A. flavescens, 13. Arrhenatherum avenaceum, 18. Holcus lanatus, 18. H. mollis, 18. Triodia decumbens, 18. Kœleria cristata, 15. Melica uniflora, 15. Molinia cærulea, 18. Catabrosa aquatica, 17. Glyceria fluitans, 18. G. plicata (including hybrida), 9. G. rigida, 14. Poa annua, 18. P. alpina, 6. P. pratensis, 18. P. trivialis, 18. P. compressa, 15. P. nemoralis (including montana and Parnellii), 16. P. cæsia (including Balfourii). Briza media, 18. Cynosurus cristatus, 18. Dactylis glomerata, 18. Festuca bromoides (including pseudo-myurus), 17. F. ovina, 18. F. duriuscula, 18. F. rubra, 18? F. elatior (including arundinacea), 15. F. pratensis (including loliacea), 18. Bromus giganteus, 16. B. asper, 16. B. sterilis, 15. B. madritensis, 5. B. commutatus, 16. B. mollis (including racemosus), 18. Brachypodum sylvaticum, 18. Triticum caninum, 15. T. repens, 18. Lolium perenne, 18. Hordeum pratense, 12. H. murinum, 13. Nardus stricta, 18. LXXXVII. Polypodium vulgare, 18. P. Phegopteris, 16. P. Dryopteris, 14. Allosorus crispus, 15. Cystopteris fragilis, 18. Aspidium Lonchitis, 7. A. aculeatum, 16. A. angulare, 12. Lastrea Oreopteris, 18. L. Filix-mas, 18. L. dilatata (including collina and glandulosa), 18. L. Fœnisecii, 8. Athyrium Filix-fœmina, 18. Asplenium viride, 12. A. Trichomanes, 18. A. lanceolatum, 5. A. Adiantum-nigrum, 18. A. Ruta-muraria, 18. A. septentrionale, 7. Scolopendrium vulgare, 18. Blechnum boreale, 18. Pteris aquilina, 18. Hymenophyllum Tunbridgense, 10. H. Wilsoni, 13. Botrychium Lunaria, 18. Ophioglossum vulgatum, 16. LXXXVIII. Lycopodium clavatum, 18. L. alpinum, 14. L. Selago, 18. L. selaginoides, 12. Equisetum Telmateia, 16. E. umbrosum, 7. E. arvense, 18. E. sylvaticum, 18. E. palustre, 18. E. limosum (including fluviatile), 18. E. hyemale, 14. E. variegatum (including Wilsoni), 9.

Subclass C B. *Subeugeogenous species.—Species which appear to occupy an intermediate position between those of the ubiquitous and eugeogenous classes. The species which should be placed in this category especially it is quite impossible to choose out accurately by means of data which are available at the present time, so that many of them will most likely be found, when more complete information respecting their distribution is procured, to range more correctly either in the preceding or succeeding classes :—*

I. Thalictrum flavum, 15. Ranunculus fluitans, 10. R. Lingua, 15. R. sceleratus, 18. II. Nymphæa alba, 18. Nuphar lutea, 16.

III.* Corydalis claviculata, 17. IV. Teesdalia nudicaulis, 15. Nasturtium sylvestre, 13. N. amphibium, 10. Sisymbrium Sophia, 15. XII. Sagina subulata, 15. Stellaria glauca, 13. XIII. Radiola millegrana, 18. XVI. Hypericum elodes, 14. XXII. Rhamnus Frangula, 13. XXIII. Trigonella ornithopodioides, 10. Trifolium subterraneum, 9. T. ochroleucum, 2. Vicia Orobus, 8. XXIV. Pyrus torminalis, 9. XXVI. Hippuris vulgaris, 17. Myriophyllum verticillatum, 10. XXVII. Peplis Portula, 18. XXXI. Herniaria glabra (including ciliata), 4. XXXIV. Sedum anglicum, 14. XXXV. Saxifraga stellaris, 11. S. nivalis, 4. XXXVIII. Cicuta virosa, 14. Sium latifolium, 11. S. angustifolium, 14. Œnanthe Lachenalii, 15. Œ. Phellandrium, 12. Œ. fluviatilis, 6. XL. Linnea borealis, 4. XLIV. Thrincia hirta, 14. Lactuca Scariola, 3. Carduus pratensis, 8. Bidens cernua, 16. B. tripartita, 16. Filago minima, 17. Senecio viscosus, 14. Pulicaria vulgaris, 4. XLV. Wahlenbergia hederacea, 10. Jasione montana, 16. LII. Solanum nigrum, 11. LIII. Limosella aquatica, 12. Sibthorpia europæa, 3. LV. Mentha Pulegium, 12. Scutellaria minor, 14. LVII. Pinguicula lusitanica, 7. Utricularia intermedia, 7. U. minor, 18. LVIII. Hottonia palustris, 11. Lysimachia vulgaris, 16. Centunculus minimus, 13. Samolus Valerandi, 16. LXII. Chenopodium olidum, 9. C. murale, 11. C. hybridum, 5. LXIII. Polygonum minus, 12. Rumex Hydrolapathum, 12. R. maritimus (including palustris), 12. LXXI. Populus canescens, 9. LXXIX. Hydrocharis Morsus-ranæ, 11. LXXX. Sagittaria sagittifolia, 13. Butomus umbellatus, 11. LXXXI. Potamogeton gramineus, 12. P. zosteræfolius, 5. P. lanceolatus, 8. Zannichellia palustris, 16. LXXXII. Lemna gibba, 10. L. polyrhiza, 12. L. trisulca, 14. Sparganium minimum. S. natans (*Bab.*) Typha angustifolia, 12. LXXXV. Cladium Mariscus, 14. Rhyncospora fusca, 3. Scirpus Savii, 8. Carex axillaris, 8. C. Pseudo-cyperus, 8. LXXXVI. Agrostis setacea, 3. Glyceria aquatica, 14. LXXXVII. Lastrea Thelypteris, 13. L. spinulosa (including uliginosa), 12. Osmunda regalis, 17. LXXXVIII. Lycopodium inundatum, 12. Pilularia globulifera, 16.

Class C. *Eugeogenous species.—Species which exhibit a decidedly marked preference for eugeogenous districts. Many of the boreal species enumerated here doubtless preponderate in the eugeogenous zones, accidentally rather than essentially :—*

Class 1. *Austral species.*

I. Ranunculus circinatus, 11. VI. Helianthemum guttatum (including Breweri), 1. VII. Viola stagnina, 3. XI. Elatine hexandra, 9. E. Hydropiper, 2. XII. Dianthus prolifer, 3. Silene Otites, 1. S. conica, 4. Cerastium aquaticum, 10. Holosteum umbellatum, 1. XVI. Hypericum linarifolium, 1. XXIII. Genista pilosa, 5. Medicajo falcata, 2. M. minima, 2. T. glomeratum, 5. T. suffocatum, 5. T. fragiferum, 13. Lotus angustissimus (including hispidus), 2. Lathyrus palustris, 5. XXV. Isnardia palustris, 1. XXVI. Ceratophyllum demersum, 11. C. submersum, 5. XXVII. Lythrum hyssopifolium, 3. XXXI. Illecebrum verticillatum, 1. Polycarpon tetraphyllum, 2. Scleranthus perennis, 2. XXXIV. Tillea muscosa, 2. XXXVIII. Carum verticillatum, 5. Peucedanum officinale, 1. P. palustre, 4. XLI. Galium anglicum, 4. XLIV. Hypochœris glabra, 12. Lactuca saligna, 5. Sonchus palustris, 2. Arnoseris pusilla, 7. Artemesia campestris, 1. Filago gallica, 1. Senecio paludosus, 1. Cineraria palustris, 2. L. Cicendia filiformis, 3. Villarsia nymphæoides, 4. LIII. Veronica verna, 1. V. tryphyllos, 2. Bartsia viscosa, 6. LV. Teucrium Scordium, 5. LVI. Pulmonaria angustifolia, 1. LXII. Chenopodium glaucum, 4. LXIII. Polygonum mite, 4. LXXIII. Spiranthes æstivalis, 1. Liparis Loeselii, 2. LXXIX. Stratiotes aloides, 4. LXXX. Alisma natans, 4. Actinocarpus Damasonium, 4. LXXXI. Potamogeton trichoides, 1. P. acutifolius, 3. LXXXV. Cyperus longus, 4. C. fuscus, 2. Scirpus carinatus, 2. S. triqueter, 2. Eriophorum gracile, 2. Carex paradoxa, 1. C. elongata, 4. LXXXVI. Leersia oryzoides, 2. Cynodon Dactylon, 2. LXXXVII. Lastrea cristata, 3.

Class 2. *Boreal species.*

II. Nuphar pumila, 2. IV. Subularia aquatica, 5. Draba rupestris, 2. Arabis petræa, 6. XII. Silene acaulis, 6. Lychnis alpina,

2. Sagina saxatilis, 2. Arenaria rubella, 2. Stellaria cerastoides, 2. Cerastium alpinum, 4. C. latifolium, 4. Cherleria sedoides, 4. XXIII. Astragalus alpinus, 1. Oxytropis campestris, 1. XXIV. Sibbaldia procumbens, 5. Alchemilla alpina, 6. XXVI. Callitriche autumnalis, 5. XXX. Saxifraga rivularis, 2. S. cernua, 1. XLIV. Mulgedium alpinum, 1. Hieracium alpinum (including melanocephalum), 5. H. chrysanthum (rupestre and atratum, *Bab.*) H. nigrescens. H. lingulatum (saxifragum, *Anglor.*) H. argenteum, 3. H. denticulatum, 1. H. strictum, 3. Sausserea alpina, 7. Gnaphalium supinum, 4. Erigeron alpinus, 1. XLV. Lobelia Dortmanna, 9. XLVI. Menziesia cærulea, 1. Azalea procumbens, 4. Arbutus alpina, 4. Pyrola uniflora, 3. L. Gentiana nivalis, 1. LIII. Veronica alpina, 2. V. saxatilis, 2. LV. Ajuga pyramidalis, 4. Lamium intermedium, 5. LVII. Pinguicula alpina, 2. LVIII. Primula scotica, 2. Lysimachia thyrsiflora, 6. LXIII. Oxyria reniformis, 7. LXXI. Betula nana, 3. Salix angustifolia, 2. S. Arbuscula, 4, S. lanata, 1. S. procumbens, 2. S. myrsinites, 1. S. reticulata, 2. LXXII. Pinus sylvestris, 3. LXXIII. Goodyera repens, 3. LXXVI. Anthericum serotinum, 1. LXXX. Scheuchzeria palustris, 5. LXXXIII. Eriocaulon septangulare, 1. LXXXIV. Juncus filiformis, 2. J. castaneus, 1. J. trifidus, 3. J. biglumis, 2. Luzula arcuata, 2. L. spicata, 6. LXXXV. Carex rupestris, 2. C. leporina, 1. C. Vahlii, 1. C. atrata, 3. C. aquatilis, 1. C. saxatilis (including Grahami), 3. C. rariflora, 1. LXXXVI. Hierochloe borealis, 1. Phleum alpinum, 2. Alopecurus alpinus, 2. Aira alpina, 4. Poa laxa (including minor). LXXXVII. Woodsia hyperborea, 2. Cystopteris montana, 1. Pseudathyrium alpestre (including flexile), 2. LXXXVIII. Lycopodium annotinum, 7. Isoetes lacustris, 7.

Class D. *Species either absolutely or mainly restricted to maritime and saliferous situations :—*

I. Ranunculus confusus, 5. III. Glaucium luteum, 15. IV. Cakile maritima, 17. Crambe maritima, 12. Lepidium latifolium, 6. L. ruderale, 5. Matthiola incana, 1. M. sinuata, 3. Brassica oleracea, 6. Sinapis Cheiranthus (including monensis), 6. Raphanus maritimus, 6. X. Frankenia lævis, 3. XII. Silene maritima, 17. Sagina maritima, 14? Honckeneja peploides, 18. Spergularia marina (including media), 18. XIV. Lavatera arborea, 5. XXIII. Trifolium maritimum, 6. Lathyrus maritimus, 5. XXXI. Corrigiola littoralis, 1. XXXVIII. Eryngium maritimum, 16. Apium graveolens, 15. Fœniculum vulgare, 6. Ligusticum scoticum, 7. Crithmum maritimum, 7. Daucus maritimus, 5. XLIV. Carduus tenuiflorus, 15. Diotis maritima, 5. Artemesia maritima (including gallica), 15. Aster Tripolium, 18. Inula crithmoides, 6. LI. Convolvulus Soldanella, 13. LVI. Mertensia maritima, 8. LVIII. Glaux maritima, 18. LIX. Armeria maritima, 18. Statice Limonium, 13. S. Bahusiensis, 7. S. binervosa, 9. S. caspia, 1. LX. Plantago maritama, 18. LXII. Atriplex portulacoides, 12. A. pedunculata, 3. A. arenaria. A. Babingtonii, 8. A. littoralis (including marina), 11. Beta maritima, 14. Salsola Kali, 15. Schoberia maritima, 18. S. fruticosa, 4. Salicornia herbacea, 18. S. radicans, 3. LXIII. Polygonum Raii, 11. LXIV. Hippophae rhamnoides, 4. LXIX. Euphorbia Peplis, 3. E. Paralias, 8. E. portlandica, 7. LXXVI. Scilla verna, 11. Asparagus officinalis, 6. LXXXI. Ruppia maritima (including rostellata), 14. Zostera marina, 5. Z. nana, 3. LXXXIV. Juncus balticus, 3. J. maritimus, 13. J. acutus, 5. LXXXV. Blysmus rufus, 10. Scirpus Holoschœnus, 1. S. maritimus, 17. Carex incurva, 3. C. arenaria, 17. C. divisa, 8. C. extensa, 15. C. distans, 17. LXXXVI. Spartina stricta, 5. Phleum arenarium, 13. Polypogon littoralis, 3. P. monspeliensis, 3. Ammophila arundinacea, 16. Aira canescens, 3. Glyceria maritima, 16. G. distans (including Borreri), 12. G. procumbens, 9. G. loliacea, 12. Poa bulbosa, 3. Festuca uniglumis, 7. Triticum laxjcum. T. junceum, 18. Elymus arenarius, 15. Hordeum maritimum, 10. Lepturus filiformis, 13. LXXXVII. Asplenium marinum, 14.

Class E. *Species which grow either in Ireland or the Channel Islands, but which have not been ascertained to occur in Britain proper :—*

I. Ranunculus ophioglossifolius. IV. Arabis ciliata. Sinapis incana. XII. Arenaria ciliata. XXXV. Saxifraga Geum. S. hirsuta. S. Andrewsii. XLIV. Centaurea Isnardi. Gnaphalium luteo-album. XLVI. Erica mediterranea. Menziesia polifolia. Arbutus Unedo. L. Cicendia Candollei. LIII. Linaria pelisserania. LIV. Orobanche arenaria. LVI. Echium violaceum. LVII. Pinguicula grandiflora. LIX. Armeria plantaginea. LXIII. Polygonum maritimum. LXXIII. Spiranthes cernua. Orchis laxiflora. LXXIV. Sisyrinchium anceps. LXXVI. Allium Ampeloprasum. A. Babingtonii. A. triquetrum. LXXXI. Potamogeton longifolius. Naias flexilis. LXXXIV. Juncus capitatus. LXXXV. Scirpus pungens. Carex canescens. LXXXVI. Arundo lapponica. Lagurus ovatus. Cynosurus echinatus. Bromus maximus. LXXXVII. Gymnogramma leptophylla. Ophioglossum lusitanicum. LXXXVIII. Equisetum Moorei.

Class F. *Species which cannot be placed conveniently under any of the preceding classes. Most of these play only a very inconsiderable part in the vegetation of the country: all of them put together will not equal the distribution of many of the typical ubiquitous species taken singly:—*

I. Ranunculus tripartitus, 3. III. Fumaria micrantha, 7. F. parviflora, 2. F. Vaillantii, 4. IV. Coronopus didyma, 4. Dentaria bulbifera, 4. Barbarea stricta, 4? Sisymbrium Irio, 4. XII. Lychnis Viscaria, 5. Sagina ciliata, 2. Arenaria norvegica, 1. XVIII. Erodium moschatum, 9? XIX. Impatiens Noli-me-tangere, 3. XXIII. Trifolium strictum, 1. T. Molinieri, 1. T. Bocconi, 1. Oxytropis uralensis, 4. Arthrolobium ebracteatum, 1. Vicia lutea, 5. Lathyrus hirsutus, 1. Orobus niger, 1. XXIV. Potentilla rupestris, 1. Rosa hibernica, 2. R. Wilsoni, 1. R. involuta, 1. R. sepium, 1. R. systyla, 5. XXV. Epilobium lanceolatum, 2. XXXIV. Sedum album, 1. S. Forsterianum, 2. XXXV. Saxifraga umbrosa, 1. XXXVIII. Physospermum cornubiense, 1. Œnanthe pimpinelloides, 5. Œ. silaifolia, 5. XLI. Galium erectum. G. montanum, 4. G. commutatum, 1. G. Vaillantii, 1. XLIV. Hieracium iricum, 3. H. rigidum. Borkhausia fœtida, 3. Carduus Forsteri, 2. C. tuberosus, 1. Centaurea Calcitrapa, 4. XLV. Phyteuma spicatum, 1. Lobelia urens, 1. XLVI. Erica ciliaris, 2. E. vagans, 1. LIII. Bartsia alpina, 3. Scrophularia Scorodonia, 1. LIV. Orobanche Picridis, 3. O. cærulea, 3. LVI. Myosotis alpestris, 2. Cynoglossum sylvaticum, 3. LVIII. Primula elatior, 2. LXII. Chenopodium botryodes, 1. LXIII. Polygonum dumetorum, 4. Euphorbia hiberna, 1. E. pilosa, 1. LXXI.

Salix stipularis. S. laurina. S. ambigua. S. Doniana. LXXIII. Corallorhiza innata, 4. Epipogium Gmelini, 1. LXXIV. Trichonema Columnæ, 1. LXXVI. Allium sphærocephalum, 1. A. Schœnoprasum (including sibiricum), 2. Ornithogalum pyrenaicum, 5. Scilla autumnalis, 4. Convallaria verticillata, 2. LXXXV. Scirpus Watsoni, 1. S. parvulus, 1. Elyna caricina, 3. Carex Boenninghausiana, 4. C. punctata, 1. C. depauperata, 1. C. tomentosa, 1. LXXXVI. Phleum asperum, 1. Alopecurus fulvus, 5. A. bulbosus, 7. Knappia agrostidea, 1. Gastridium lendigerum, 6. Arundo stricta, 1. Briza minor, 2. LXXXVII. Woodsia ilvensis, 4. Asplenium germanicum, 5. Adiantum Capillus-veneris, 3. LXXXVIII. Equisetum Mackaii, 1.

Though it may be desirable to include them in order to complete the catalogue, the distribution of most of the plants which compose the introduced category has been mainly regulated by artificial causes; so that with reference to a few of the most fully established only, should we be able to trace the operation of lithological influences.

They may be conveniently arranged in two principal divisions according to the method of their introduction: and these it will be needful again to subdivide so as to separate the earlier and completely established species from the more decided aliens.

Class G. *Species presumed to have been introduced by agriculture or with ballast, but now completely established:—*

I. Adonis autumnalis. Ranunculus arvensis. Delphinium Consolida. III. Papaver hybridum. P. Argemone. P. dubium. P. Rheas. IV. Thlaspi arvense. Iberis amara. Erysimum cheiranthoides. Brassica campestris (including Rapa). B. Napus. Sinapis alba. S. nigra. S. muralis. Raphanus Rhaphanistrum. XII. Silene noctiflora. Lychnis Githago. XXIII. Medicago sylvestris. Melilotus officinalis. M. arvensis. XXXVIII. Bupleurum falcatum. B. rotundifolium. Æthusa Cynapium. Caucalis daucoides. Scandix Pecten. XLI. Galium tricorne. XLII. Fedia Auricula. F. dentata. XLIV. Centaurea Cyanus. Chrysanthemum segetum. LI. Cuscuta Trifolii. LV. Galeopsis ochroleuca. LXIX. Euphorbia platyphylla. LXXXVI. Digataria humifusa. Setaria viridis. Apera Spica-venti. A. interrupta. Avena fatua. Bromus secalinus. Lolium temulentum.

Class H. *Agricultural aliens or ballast plants* :—

III. Glaucium violaceum. III.* Fumaria confusa. IV. Lepidium Draba. Camelina sativa. C. dentata. Alyssum calycinum. Farsetia incana. Erysimum virgatum. E. orientale. XII. Saponaria Vaccaria. XIII. Linum usitatissimum. XIV. Malva verticillata. XVIII. Erodium cygnorum. XXIII. Medicago sativa. Melilotus vulgaris. M. parviflora. Trifolium incarnatum. T. stellatum. T. resupinatum. T. patens. T. agrarium. T. elegans. Scorpiurus subvillosus. Vicia Ervilia. XXXVIII. Tordylium maximum. Caucalis latifolia. XLI. Asperula arvensis. XLIII. Dipsacus Fullonum. XLIV. Borkhausia setosa. Carduus pycnocephalus. Centaurea solstitialis. Galactites tomentosa. Anacyclus radiatus. Anthemis anglica. A. tinctoria. XLIV*. Xanthium strumarium. XLV. Specularia Speculum. L. Collomia grandiflora. LI. Cuscuta Epilinum. C. Hassiaca. LIII. Veronica Buxbaumbii. Linaria supina. LIV. Orobanche ramosa. LV. Stachys annua. LVI. Anchusa officinalis. LXI. Amaranthus Blitum. A. retroflexus. LXIII. Polygonum Fagopyrum. Rumex scutatus. LXXXVI. Spartina alterniflora. Digitaria sanguinalis. Panicum Crus-galli. Setaria verticillata. S. glauca. S. italica. Phalaris canariensis. P. paradoxa. Avena strigosa. Ceratochloa unioloides. Bromus arvensis. B. patulus. B. squarrosus. B. rigidus. B. tectorum. Lolium italicum. L. linicola.

Class I. *Species presumed to have been introduced by horticulture or arboriculture, but now completely established* :—

I. Aconitum Napellus. III. Chelidonium majus. XII. Saponaria officinalis. XVIII. Geranium pyrenaicum. XX. Oxalis corniculata. XXIX. Prunus avium. Mespilus germanica. Pyrus communis. XXXI. Berberis vulgaris. XXXII. Ribes nigrum. R. Grossularia. XXXIV. Sedum reflexum. XXXVIII. Astrantia major. Eryngium campestre. Smyrnium Olusatrum. Carum Carui. XL. Lonicera Caprifolium. L. Xylosteum. XLII. Fedia carinata. XLIV. Tragopogon porrifolius. Carduus Marianus. Onopordum Acanthium. Gnaphalium margaritaceum. Senecio saracenicus. XLIX. Vinca minor. LIII. Verbascum Blattaria. V. virgatum. Scrophularia vernalis. LV. Mentha viridis. Leonurus Cardiaca. LVI. Anchusa sempervirens. Asperugo procumbens. LVIII. Cyclamen hederæfolium. LXV. Daphne Mezereum. LXIX. Euphorbia Lathyris. LXX. Humulus Lupulus. LXXI. Populus alba. P. nigra. Salix acutifolia. LXXV. Galanthus nivalis. Leucojum æstivum. LXXVI. Tulipa sylvestris. Muscari racemosum.

Class J. *Horticultural aliens* :—

I. Anemone apennina. A. ranunculoides. Eranthis hyemalis. Pæonia corallina. III. Papaver somniferum. P. setigerum. Glaucium phœniceum. III.* Corydalis lutea. C. solida. IV. Crambe orientalis. Isatis tinctoria. Lepidium sativum. Armoracia rusticana. Koniga maritima. Arabis Turrita. Barbarea præcox. Sisymbrium polyceratium. Cheiranthus Cheiri. Hesperis matronalis. Malcolmia maritima. V. Reseda fruticulosa. XII. Dianthus barbatus. D. plumarius. D. Caryophyllus. Cucubalus baccifer. Silene italica. S. Armeria. XIV. Malva crispa. M. nicæensis. Althæa hirsuta. XV. Tilia intermedia. T. grandifolia. XVI. Hypericum calycinum. XVII. Acer Pseudoplatanus. XVIII. Geranium nodosum. G. phæum. G. angulatum. G. striatum. XIX. Impatiens fulva. XX. Oxalis stricta. XXI. Staphylea pinnata. XXIII. Coronilla varia. Lathyrus latifolius. XXIV. Spiræa salicifolia. Fragaria elatior. Rosa cinnamomea. R. lucida. Pyrus domestica. XXV. Œnothera biennis. XXVIII. Tamarix anglica. XXX. Claytonia perfoliata. XXXII. Epimedium alpinum. XXXIV. Sedum dasyphyllum. S. Cepæa. S. sexangulare S. stellatum. Sempervivum tectorum. XXXVIII. Petroselinum sativum. Archangelica officinalis. Anthriscus Cerefolium. Coriandrum sativum. XL. Durvillea humilis. XLI. Asperula taurina. XLII. Centranthus ruber. C. Calcitrapa. Valeriana pyrenaica. XLIV. Hieracium aurantiacum. H. amplexicaule. Carduus oleraceus. Centaurea montana. Calendula arvensis. Petasites albus. Nardosmia fragrans. Erigeron canadensis. Aster brumalis. Senecio squalidus. S. Doria. Doronicum Pardalianches. D. plantagineum. Achillea tomentosa. A. serrata. A. tanacetifolia. XLV. Campanula persicifolia. C. Medium. XLVI. Vaccinium macrocarpum. XLIX.

Vinca minor. LII. Datura Stramonium. Physalis Allekengi. Lycium barbarum. LIII. Antirrhinum majus. Linaria Cymbalaria. L. purpurea. Mimulus luteus. LIII.* Acanthùs mollis. LV. Melissa officinalis. Teucrium Chamædrys. Lamium maculatum. LVI. Symphytum asperrimum. S. orientale. S. tauricum. Borago officinalis. Pulmonaria officinalis. P. virginica. Omphalodes verna. Echinospermum Lappula. E. deflexum. LVIII. Lysimachia punctata. L. ciliata. LXII. Atriplex nitens. A. hortensis. LXIII. Rumex alpinus. LXVII. Aristolochia Clematitis. LXIX. Euphorbia coralloides. E. Esula. E. Cyparissias. E. dulcis. E. salicifolia. LXX. Urtica pilulifera. Cannabis sativa. LXXI. Castanea vulgaris. Salix cuspidata. S. undulata. S. petiolaris. LXXIV. Iris tuberosa. I. Xiphium. I. xiphoides. I. pumila. I. germanica. Crocus vernus C. nudiflorus. C. aureus. C. minimus. LXXV. Narcissus conspicuus. N. moschatus. N. incomparabilis. N. minor. N. lobularis. N. biflorus. N. poeticus. Leucojum vernum. LXXVI. Lilium Martagon. L. pyrenaicum. Allium ambiguum. Ornithogalum nutans. O. umbellatum. Convallaria bifolia. LXXIX. Anacharis Alsinatrum. LXXXIV. Luzula nivea. LXXXVII. Athyrium fontanum. Onoclea sensibilis.

Of these classes, G and I are very nearly identical respectively with the Colonist and Denizen: and H and J taken together with the Alien categories of citizenship of the Cybele. The "Incognita," such species as are not clearly ascertained to inhabit Britain, or which are supposed to have been erroneously recorded or to have become extinct, it will not be worth while to enumerate here.

## IV.—SUMMARY.

It may not be undesirable, though there can scarcely be much risk of misapprehension, to preface a numerical summary by an explanation to the effect that the classes which have been indicated cannot from their nature, even were a complete series of data relative to the distribution of the species throughout Britain available, be bounded with strict mathematical accuracy, and that we are carried forward from one to another, not by a sudden change, but by imperceptible stages of transition. *Anemone Pulsatilla* and *Aquilegia vulgaris* are rigidly restricted to dysgeogenous districts. *Geranium sanguineum* and *Anthyllis Vulneraria* evince a less decidedly marked preference for situations of the same class. *Rosa arvensis* and *Carduus nutans* show for similar stations a still fainter partiality, and may sometimes be met with in distinctly eugeogenous districts. Such being the case, the first pair are placed amongst the dysgeogenous, the second pair amongst the subdysgeogenous, and the third pair amongst the ubiquitous species. Between these instances there is in respect of lithological relation every intermediate gradation to be traced; and unless it is borne in mind that this classification (like all other natural arrangements when they are attempted to be reduced to definite expression) is necessarily, to a considerable extent, arbitrary, it cannot be properly understood.

| | Class. | No. of Species. | Per Centage. |
|---|---|---|---|
| A. | Dysgeogenous . . . . . | 92 | 7+ |
| A B. | Subdysgeogenous . . . . | 75 | 6— |
| B. | Ubiquitous . . . . . . | 699 | 53+ |
| C B. | Subeugeogenous . . . . | 89 | 7— |
| C 1. | Eugeogenous austral . . . | 65 | 5— |
| C 2. | ,, boreal . . . | 79 | 6+ |
| D. | Maritime . . . . . . | 90 | 7— |
| E. | Hibernian and Sarnian . . | 37 | 3— |
| F. | Local or Dubious . . . . | 89 | 7— |
| | | 1315 | |
| G. | Agricultural introductions . | 41 | |
| I. | Horticultural do. . . . . | 43 | |
| | | 1399 | |
| H. | Agricultural aliens . . . | 66 | |
| J. | Horticultural do. . . . . | 150 | |
| | | 1615 | |

CONDENSED SUMMARY.

| Class. | No. of Species. | Per Centage. |
|---|---|---|
| Restricted . . . . . . . | 400 | 31— |
| Maritime . . . . . . . | 90 | 7— |
| Ubiquitous . . . . . . . | 699 | 53+ |
| Local, etc. . . . . . . . | 126 | 9+ |
| | 1315 | |

V. As an illustration of the modification of a specific type which geognostic influences sometimes effect, the case of the Sweet and Hairy Violets (*Viola odorata* and *Viola hirta*) may be adduced. Since the names by which they are known to science were first imposed by Linnæus, every British and nearly every Continental author who has given descriptions, has treated them as distinct species, and some have even considered the White violet (*V. alba*) as a third species. *V. odorata* has sarmentose stems, pubescent petioles, odorous flowers, and entire upper petals: *V. hirta* is entirely without runners, its flowers are scentless, its petioles densely covered with spreading hairs, its upper petals emarginate: and numerous other differences of lesser moment have been pointed out. But the characteristic marks of *hirta* appear to be more or less fully developed in proportion as it grows in more or less dysgeogenous situations, and intermediate stages of transition between typical *hirta* and typical *odorata* may readily be traced; so that it is most likely that *hirta* is only the dysgeogenous development of a specific type to which *odorata* and *alba* also belong. The circumstances of this case are treated in fuller detail in an article in the August number of the *Phytologist* for the present year. Upon this question by itself a whole book might be written, but a single example will suffice to illustrate the subject here. It would be a great improvement upon our present plan of naming varieties if some uniform system could be adopted of designating analogous modifications (*i. e.* changes of different species produced by the operation of the same physical factors) by similar names.

VI.—An inquiry relative to the influences which the subjacent rocks exercise upon the dispersion and morphology of our indigenous representatives of the lower orders of plants, and even of animals, would afford scope for an interesting series of investigations: but the distribution of the remaining members of the British Flora and Fauna is much less completely and perfectly known than that of the Flowering Plants and Ferns, and the consideration of these questions does not fall within the scope of my present design. Amongst the Mosses, *Phascum rectum, Seligeria calcarea, Tortula tortuosa,* and *Cylindrothecium Montagnei,* afford illustrations of dysgeogenous; and *Weissia crispula, Dicranum virens, Tortula latifolia,* and *Orthotrichum Sprucei,* of eugeogenous species. *Parmelia crassa, Parmelia calcarea, Biatora rupestris,* and *Verrucaria immersa,* are dysgeogenous, and *Lecidea geographica, Lecidea fuscoatra, Umbilicaria proboscidea,* and *Verrucaria umbrina,* eugeogenous lichens. Amongst animals, the influence of geognostic contrasts is perhaps most readily appreciable in the terrestrial Gasteropoda. *Helix lapicida* and *Pupa Juniperi,* for instance, afford familiar illustrations of dysgeogenous Mollusca.

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THE foregoing paper was read before the Zoologico-Botanical section of the Association on the second day of the meeting at Glasgow (Sept. 14, 1855). A long and animated discussion ensued relative to the practicability of the classification proposed, of which it may not be uninteresting to subjoin an outline. The following is extracted from the report of the proceedings in the *Athenæum*:—

"PROFESSOR BALFOUR said, that the effort to classify plants according to the geological strata on which they are found, had often been made without success. To those inquiring in this direction, Mr. Baker's paper would clearly indicate the difficulties of the subject; and he mentioned a number of plants which might as consistently go into one or other of the divisions established by Mr. Baker. (Compare p. 28, J. G. B.)

"DR. FLEMING stated, that the growth of plants was determined by the superficial deposits on rocks, not by the rocks themselves.

"DR. DICKIE stated, that in some few instances in the north of Scotland he had observed the kind of rock having an influence on the vegetation.

"DR. LANKESTER pointed out, that the growth of plants was frequently determined by the physical nature of the soil, quite independent of its chemical properties; and that this point was, to a considerable extent, overlooked in estimating the nature of the earth's surface in relation to the distribution of plants."